Biological Resources

The study area features a high concentration of globally significant, diverse, rare species and habitat. The following section describes the natural resources of the study area as they exist today, from its larger ecological context to specific locations with rare or unique qualities.

The southern California coast, located in a globally rare biome, is comprised of Mediterranean vegetation types included in the evergreen sclerophyllous forest. A biome is the largest geographical biotic unit comprised of similar plant and animal communities. The evergreen sclerophyllous forest biome is found in areas with a Mediterranean climate that is characterized by mild, rainy winters and hot, dry summers. This climate is created by the interaction of global weather patterns and cold-water upwelling on the west coast of a continent. There are only four other sites in the world that share these climactic conditions. The other locations are located in Europe, Chile, Africa and South Australia at approximately the same latitude, 30-40 degrees. Only 18% of evergreen sclerophyllous forest's former range remains in the world, making it rare and ecologically significant.[10]

Landforms and Marine Environment

The study area coast east of Point Conception is part of the continental borderland of the Southern California Bight (SCB). The SCB is commonly delineated as the marine system that extends from Point Conception to Punta Banda in Baja California, Mexico (See Topography and Oceanography map in the "Maps" section). It is referred to as a "bight" because the characteristic north-south trending coastline of western North America experiences a significant curvature along the coast of southern California creating a marine environment of complex circulation patterns.[11] The SCB is the temporary and permanent home to a wide variety of marine organisms, and it functions as a breeding ground for a rich array of marine species including pelicans, peregrine falcons, sea otters, whales, dolphins, sea lions and other pinnipeds.[12]

The uniqueness of this marine system can be attributed to the confluence of the two major oceanic currents and the shape of the continental shelf that work together to create a marine transition zone in the Santa Barbara Channel. The northern portion of the study area coast features cooler northern waters carried south by the California Current and reflects the biological assemblages of the Oregonian province. Waters south and east of Point Conception carried by the Southern California countercurrent support the warm temperate biota characteristic of the California province. The southern flow of the California Current and the prevailing winds from the northwest work together to drive cold water from the north directly into the northern Channel Islands. The California Current is forced offshore near Point Conception, creating a large eddy current referred to as the Santa Barbara Gyre. This gyre system generally flows in a counter-clockwise direction between the Santa Barbara coast and the Channel Islands. Nutrient-rich water wells up from the deep sea, supplying exceptionally rich food webs in the waters off the study area coast. Larval and juvenile stage fish entrained in the eddy current benefit from high food availability, until they grow strong enough to escape the circulating current.[13-14]

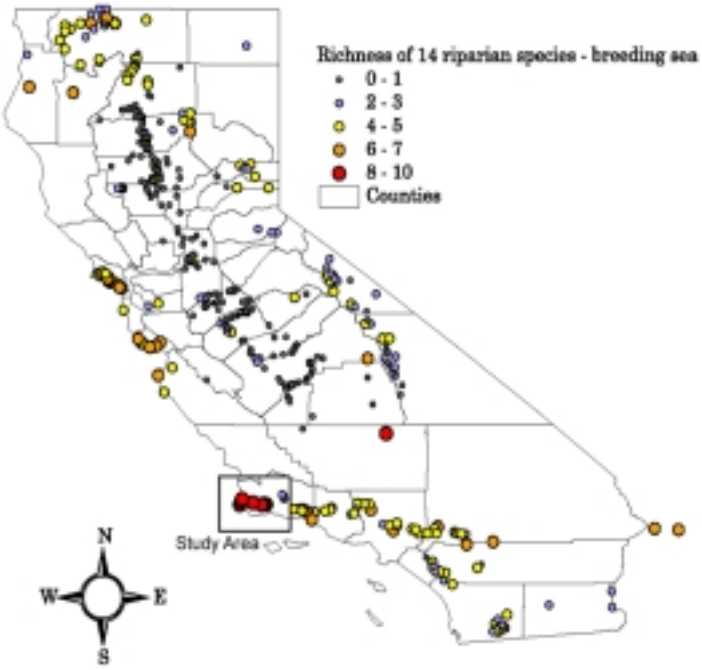
Significance to Marine Systems

Because the study area coast is the largest and healthiest remaining coastal area in southern California, its protection is important to terrestrial and coastal ecosystems such as the Channel Islands National Marine Sanctuary (CINMS), located within the SCB just off the study area coast. The CINMS is internationally recognized as a United Nations, Educational, Scientific and Cultural Organization (UNESCO) Biosphere Reserve (California Coastal Conservancy, 2001).

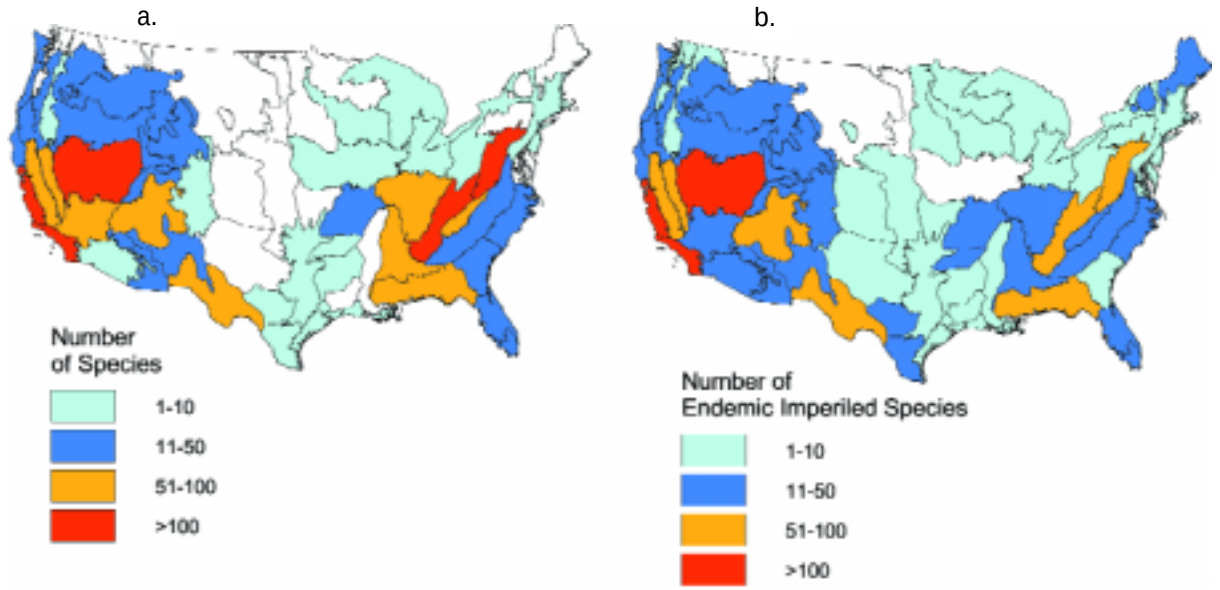
Watersheds along the Gaviota Coast have a direct impact on the SCB as they transport nutrients, sediment and pollution. Marine and terrestrial ecosystems work together in a "large-scale system

Biodiversity within the Gaviota Coast study area

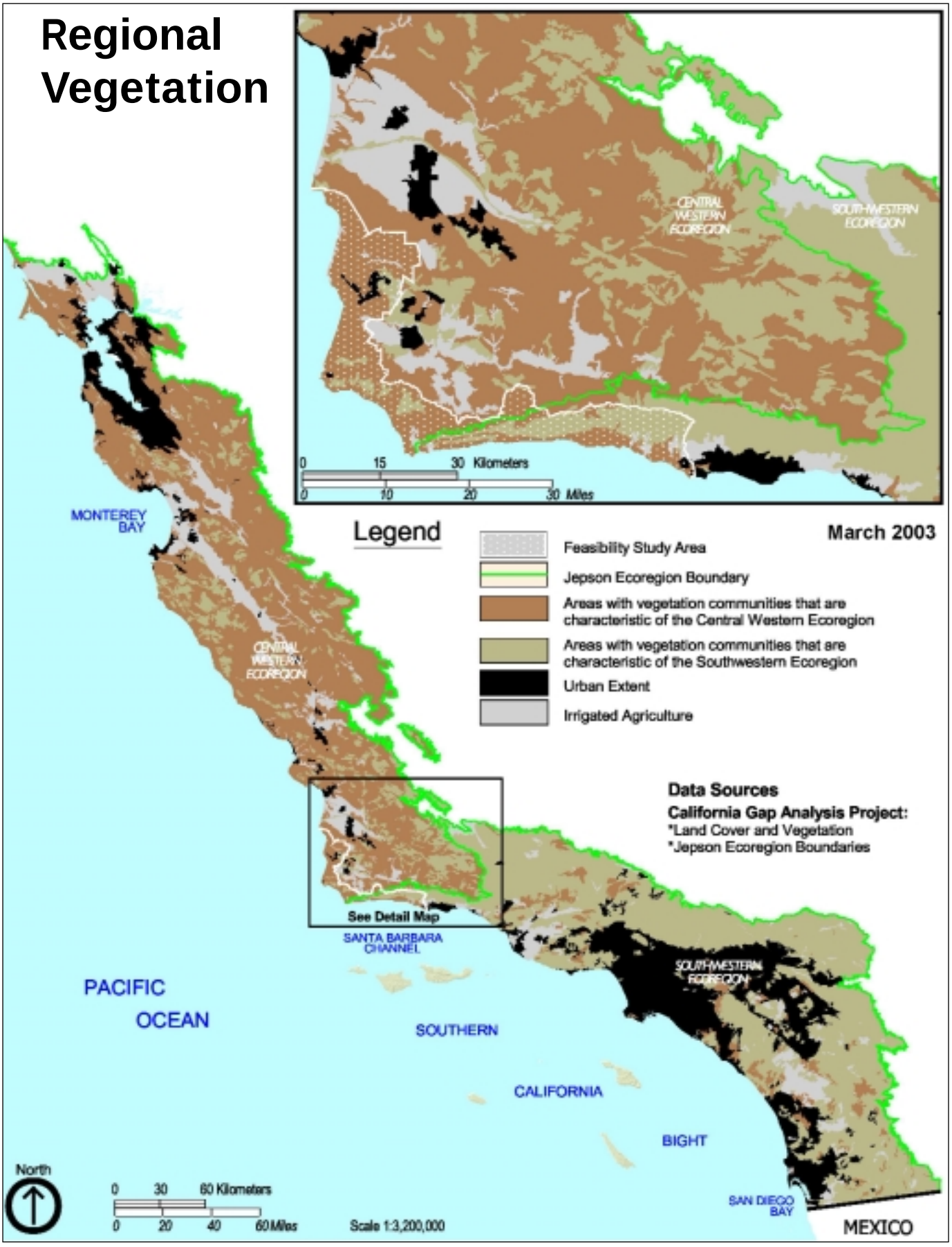
Locations of the Mediterranean vegetation types. Image from Blueplanet Biomes.



Species richness of 14 focal riparian species at census sites throughout California. Map printed courtesy of the Point Reyes Bird Observatory (RHJV, 2000).
Abundance and richness of bird species are key indicators of riparian health. This figure shows the relative richness of riparian bird species in the study area within a statewide context.



Distribution of imperiled species by ecoregion, from Precious Heritage: The Status of Biodiversity in the United States, (Stein, Kutner, and Adams, 2000).
A high diversity of imperiled species is found in both the Central Western and Southwestern Ecoregions shown in red, making coastal California a "hot spot" for biodiversity.
(a) Coastal California, the Great Basin, and the Appalachians stand out in this assessment of imperiled species according to Nature Conservancy-defined ecoregions of the lower 48 states.
(b) Focusing on those imperiled species that are restricted to a single ecoregion further highlights the significance of central and southern coastal California and the Great Basin.


Regional Vegetation
CENTRAL WESTERN ECOREGION
SOUTHWESTERN ECOREGION
0 15 30 Kilometers
0 10 20 30 Miles
MONTEREY BAY
Legend
March 2003
Feasibility Study Area
Jepson Ecoregion Boundary
Areas with vegetation communities that are characteristic of the Central Western Ecoregion
Areas with vegetation communities that are characteristic of the Southwestern Ecoregion
Urban Extent
Irrigated Agriculture
Data Sources
California Gap Analysis Project:
*Land Cover and Vegetation
*Jepson Ecoregion Boundaries
See Detail Map
SANTA BARBARA CHANNEL
PACIFIC OCEAN
SOUTHERN CALIFORNIA BIGHT
North
0 30 60 Kilometers
0 20 40 60 Miles
Scale 1:3,200,000
SAN DIEGO BAY
MEXICO

of relationships where biophysical processes of land, water and wind work in concert to form unique species and habitats of the [SCB]."[15] For the past 150 years most of the watersheds and wetlands along the southern California coast have been impacted by agricultural and urban development. While the SCB's geologic, hydrologic, climatic, and ecological characteristics are unique in the country, it also has experienced one of the most dramatic environmental transformations due to rapid growth and development.[16] (See Watersheds map in the "Maps" section).


badger, CDFG photo

BIODIVERSITY

The transverse east-west ridge of the Santa Ynez Mountains acts as a topographic barrier between the two climate zones associated with the marine systems, and marks the north-south border of the Southwestern and Central Western Ecoregions (See Regional Vegetation figure on previous page). Many species reach their northern and southern limits here because of the elevation limits imposed by the transverse ranges.[17] The Southwestern and Central Western Ecoregions are two of the most biologically diverse ecoregions in the world and have some of the highest concentrations of globally-important, rare species in the country.[18] The diversity of species within the study area is a result of the constant intermingling of habitat and ecosystems in the climatic transition zone between the two terrestrial ecoregions and the transitional nature of the Southern California Bight.[19-20] Of the approximately 1,400 plant and animal species estimated to exist within the study area,[21] there are 24 federally- or state-listed threatened or endangered plant and animal species and another 60 species considered rare or of special concern (See tables A1: Rare, Threatened, and Endangered Plants and A2: Rare, Threatened, and Endangered Animals in the "Tables" section).


weasel, CDFG photo


Lompoc yerba santa, Roxanne Bittman

PLANT COMMUNITIES

The diversity of landforms combined with the transition between climatic, oceanic and terrestrial regions creates one of the most unique botanical regions in North America. The plant communities within the study area include the southern and northernmost limits for many species. It has been estimated that there are 750 plant species indigenous to the Gaviota Coast from Point Sal to Coal Oil Point. This includes approximately 15% of the native plant species in the state of California. While a detailed study of the botanic characterization has yet to be completed, studies on Vandenberg AFB and Hollister Ranch provide a good indication of the complexity and diversity of botanical resources in the region[22] (See Vegetation and Natural Resources maps in the "Maps" section).

Marine Intertidal and Nearshore Communities: The marine intertidal communities along the study area coast are important sources of food and shelter for many species. These communities include rocky intertidal areas, kelp beds, sea grasses and reefs.

Rocky marine intertidal zones are shoreline areas rich in species diversity that feature organisms that are able to withstand waves and drying out periods during tidal changes. Dominant organisms include California mussels, chitons, starfish, sea anemones, barnacles, snails, crabs, kelp and sea lettuce. The rocky intertidal zone also provides essential foraging for seabirds and marine mammals during low-tide. Stretches along the coast of Vandenberg AFB, Bixby and Hollister ranches have had very little human disturbance.[24-26]

Important plant communities of the nearshore area are giant kelp (*Macrocistis pyrifera*), seagrasses such as surfgrass (*Phyllospadix spp*.), and eelgrass (*Zostera spp*.). These aquatic plant communities grow primarily on rocky bottoms and provide essential food and habitat for many marine species. Giant kelp is considered the most important marine habitat of the SCB. It provides food and shelter to marine and bird species, and serves as a nursery to juvenile fishes. Giant kelp beds thrive in areas protected from northerly swells, and are abundant on Santa Barbara's Channel Coast.[27] Kelp beds in southern California have been reduced by two-thirds since 1957.[28] Kelp beds are impacted by storm events, warming trends, overgrazing, competition, sedimentation, pollution, harvesting, and disease.[29] The southern sea otter plays an important role in maintaining the health of the kelp community by feeding off the sea urchins that feed off the kelp.[30]

Surfgrass meadows attach to rocky shoreline in low intertidal depths. This marine plant is highly productive, providing important microhabitat for 71 species of algae and 90 species of invertebrates. Threats to surfgrass include sewage discharge, oil seepage, and oil pollution.[31-32]

Significant Species Diversity

The two ecoregions that transition within the study area form what is recognized as a "hot spot" for biodiversity because of the high level of species endemism and potential threats to habitat.[23] Rare and endangered habitat in the study area includes bishop pine forest, tanbark oak forest, valley oak woodlands, coastal sage-chaparral scrub, central maritime chaparral, native grassland, wetlands, riparian woodlands, coastal dunes and strand, and marine ecosystems such as kelp beds and sea grasses, and rocky marine intertidal zones.

Eelgrass grows primarily in bays and estuaries, attaching to mud and sand bottoms. Eelgrass beds are important for primary production, nutrient cycling, and substrate stabilization. Eelgrass communities in southern California are heavily impacted by human alteration. Threats to eelgrass communities include oil spills, pollution, habitat disturbances from development, cumulative impacts from boat anchors, and overgrazing by sea urchins. Eelgrass communities are located primarily along the Gaviota and Corral Canyon coastal areas.[33-34]

Shallow subtidal reefs are offshore rocky areas that serve as attachment points for a number of algae, invertebrate, and fish species. Reefs are found all along the study area coast with major reefs occurring off of rocky headlands.[35] Naples Reef, a reef wetland, is one of the few reef wetlands of this type found along the southern California coast.[36] Scientists that have studied the Naples Reef have documented that it contains the highest diversity of intertidal organisms within the County.[37] The benthic algae on Naples reef are considered one of the best examples on the South Coast. The Santa Barbara County Comprehensive Plan Conservation Element recommends that Naples Reef be preserved as a scientific research and educational area because of its unusual biological character.[38]

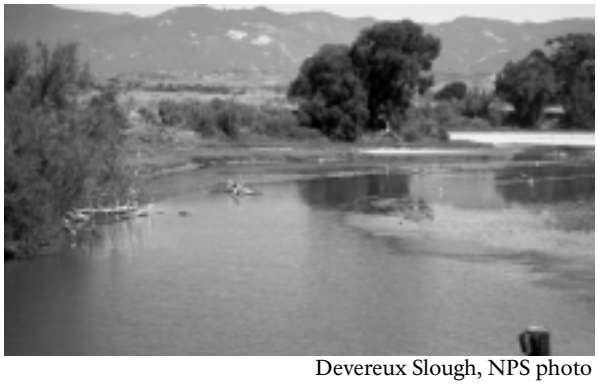
Estuarine Wetlands: Estuarine wetlands are found in coastal areas where creeks, rivers or embayments mix with the ebb and flow of ocean water. Approximately 90% of the estuarine wetlands in southern California have been destroyed by development over the past century.[39] The study area includes a majority of the few estuarine wetlands that remain in southern California. These wetlands are recognized as a significant biological resource and designated "Environmentally Sensitive Habitat" under the Santa Barbara County Coastal Plan. Because of their scarcity, all estuarine wetlands can be considered rare and threatened.[40-41] Estuarine wetlands are suitable habitat for the federally-listed endangered plants La Graciosa thistle (*Cirsium loncholepis)* and salt marsh bird's beak (*Cordylanthus maritimus ssp.*). The La Graciosa thistle historically grew along the Santa Ynez River on Vandenberg AFB.[42-43]

Estuarine wetlands within the study area include: Devereux Slough at Coal Oil Point Reserve, Santa Anita Estuary on Hollister Ranch, the Santa Ynez and San Antonio lagoons, the Santa Ynez Coastal Marsh, the mouth of the Canada Honda Creek, and Dune-Creek Estuaries at San Antonio Dunes Terrace.[44-46]

Palustrine Wetlands: Palustrine wetlands are dominated by trees, shrubs, persistent or non-persistent emergents, mosses or lichens in tidal areas with low salinity. Vernal pools, ponds and dune swale wetlands are rare palustrine systems found within the study area. In southern California, vernal pools are considered an endangered ecosystem.[47] They are only found in San Diego and Santa Barbara counties.[48] Palustrine wetlands are also suitable habitat for the La Graciosa thistle (*Cirsium loncholepis).*[49]

Several vernal pools have been identified on Vandenberg AFB near Burton Mesa. Dune swale wetlands at the San Antonio Terrace Dunes, riparian willow woodlands along the Santa Ynez River and San Antonio Creek, and the Barka Slough freshwater marsh are additional palustrine sites on Vandenberg AFB. Ellwood Mesa features a 25-acre vernal pool complex.[50-52]

Riverine Wetlands: Intermittent riverine wetlands include tributaries of the Santa Ynez River and San Antonio Creek. Perennial systems are found near Point Sal, in the Santa Ynez Mountains and on Sudden Flats at the south of Vandenberg AFB.[53] Riverine wetlands on Hollister Ranch, defined by the Hollister Ranch Conservancy as "Representative Botanical Areas of Note," include the Cojo, Bulito, Santa Anita, and Agua Caliente riparian corridors.[54]



Devereux Slough, NPS photo

Riparian Resources: Riparian habitat is located in many of the coastal watersheds within the study area. Riparian forests support the highest diversity of plant and animal species in North America and are essential elements of our country's natural heritage. This habitat has been reduced more than

any other habitat type in North America due to various factors associated with disruption of natural hydrological conditions. These factors include dams, levees, channelization, clearing associated with farming and development, over-grazing, and invasion by exotic species. In California, Arizona and New Mexico, riparian forests are an endangered ecosystem. Riparian habitat now covers less than 5% of its historic range in California, making up less than 0.5% of the total land area.[55-56]

Abundance and richness of bird species is an important indicator of riparian health. Bird species in riparian habitats on Vandenberg AFB are among the richest in California. Because most of the coastal riparian habitat of southern California has been degraded or destroyed, this richness of habitat within the study area is of even greater importance. Vandenberg AFB, Santa Clara River, Santa Margarita River, and Camp Pendleton in Orange County have the only intact, large coastal riparian habitats remaining. Federally-listed endangered species that rely on this habitat include the southwestern willow flycatcher *(Empidonax trailii extimus)*, the California red-legged frog *(Rana aurora draytonii),* the tidewater goby *(Eucyclogobius newberryi),* the unarmored threespine stickleback *(Gasterosteus aculeatus williamsoni),* and the least Bell's vireo *(Vireo bellii pusillus*).[57-58]

Grasslands: California native grasslands are a critically endangered ecosystem and extremely rare due to the introduction of European grasses for grazing purposes during the Spanish settlement. California has seen a 99% loss of native grassland.[59] The study area contains exotic, annual, and native grass species. Activities such as burning, agriculture, urbanization, over-grazing, and introduced species have significantly reduced the number of native grassland communities. Annual, non-native grassland that dominates the study area landscape includes species native to Europe such as wild oats *(Avena fatua),* soft chess *(Bromus hordeaceus),* ripgutgrass (*Bromus diandrus)* and Italian ryegrass *(Lolium multiflorum)*. Native grasslands include purple needlegrass (*Nassella pulchra),* California barley *(Hodeum brachyanthereum* ssp. *californicum),* and native wildflowers and forbs.[60-61]

Several isolated patches of native grasslands remain in Santa Barbara County. These include patches that border Camino Cielo Road along the crest of the Santa Ynez Range, west of Goleta[62] and several areas on Vandenberg AFB.[63] A regionally-rare 40-acre native grassland is located on Ellwood Mesa, just west of Coal Oil Point Nature Reserve. The Santa Barbara County Coastal Plan considers native grasslands "Environmentally Sensitive Habitat."[64]

Coastal Dunes and Strand: Coastal strand in southern California is considered a critically endangered habitat.[65] Coastal strand and foredunes contain plant communities that have adapted to the sandy, unstable conditions associated with this habitat. Examples include sand-verbenas that contain fruits that disperse well in wet conditions. Native species such as beach saltbush (*atriplex leucophylla)* and Beachbur *(Ambrosia chamissonis)* have root systems that stabilize the shifting dune environment. Where dune environments have been disturbed, ice plant (*Carpobrotus chilenis or C.edulis)* dominates.[66]

Threatened species in coastal dune areas on Vandenberg AFB include surf thistle *(Cirsium rhothophilium),* black-flowered figwort, *(Scophularia atrata)* and beach spectacle-pod *(Dithyrea maritima)*.[67] Several dune species at their northernmost and southernmost limits can be found on protected dunes at Coal Oil Point. These include southern beach primrose *(Camissonia cheiranthifolia suffruticosa)* at its northernmost limit and northern bush lupine *(Lupinus arobreus)* at its southernmost limit.[68] Dune locations within the study area occur from Point Sal to Purisima Point, at the mouth of the Santa Ynez River, Point Conception, and near Coal Oil Point.[69-70]

The fragility of coastal dune habitat is evident at Coal Oil Point where there is juxtaposition between protected and unprotected dunes. Fragile native plants have been trampled and overcome by stronger invasive species in areas of unprotected

dunes, while fragile and rare native species remain on protected dunes. Coastal dunes and beaches at Vandenberg AFB and Coal Oil Point are used as nesting sites for federally threatened and endangered bird species such as the western snowy plover *(Charadrius alexandrinus nivosus)* and the California least tern *(Sterna antillarum browni)*.[71-72]

Dune Scrub: Dune scrub can be described as shrub-dominated communities found on back-dunes. Both northern and southern coastal dune scrub communities are found within the study area. Northern coastal dune scrub is found mostly on Vandenberg AFB along the San Antonio Terrace Dunes and Burton Mesa. Regional endemics associated with northern coastal dune scrub include Blochman's Groundsel *(Senecio blochmaniae)* and Shrubby Monardella *(Mondardella frutescens)*. Southern coastal dune scrub can be found at Coal Oil Point Reserve and is one of the best and last examples found in southern California.

Dune species at their northernmost and southernmost limits can be found on protected dunes at Coal Oil Point. These include southern beach primrose *(Camissonia cheiranthifolia suffruticosa)* at its northernmost limit and northern bush lupine *(Lupinus arobreus)* at its southernmost limit.[73-74]

Coastal Bluff Scrub: Coastal bluff scrub is found along lower bluff communities that tolerate ocean spray. Plant species common to bluff communities include Quailbush (*Atriplex lentiformis* ssp. *lentiformis)*, wooly sea-blite *(Suaeda taxifolia)* and the striking giant coreopsis *(Coreopsis gigantean)*. Species specific to northern communities include coastal bluff goldenbush *(Isocoma menziesii* var. *sedoides)* and southern bluff scrub communities include species such as cliff aster *(Malacothrix saxatilis* var. *saxatillis).*[75]

sand dunes at Point Sal, Rick Skillin

Coastal Sage Scrub: Coastal sage scrub is characterized by drought tolerant plants that grow along coastal terraces and foothills. Coastal sage scrub has high levels of species diversity. The conversion of land to residential, agriculture, and industrial uses has endangered this community.[76] Only 15% of its former range remains in southern California.[77] This type of habitat is found throughout the study area and includes the federally-listed endangered Gaviota tarplant (*Deinandra increscens* ssp. *villosa*).[78] Coastal sage-chaparral is a globally rare type of coastal sage scrub habitat that has a high level of species endemism and diversity.[79] This type of coastal sage scrub can be found between Gaviota State Park and Arroyo Hondo.[80]

Chaparral: Chaparral communities are comprised of dense evergreen shrubs that occur on California slopes and coastal mesas. Common chaparral species within the study area include chamise chaparral *(Adenostoma fasciculatum)*, bigpod ceanothus *(Ceanothus megacarpus* var. *megacarpus),* and several species of manzanita. Chaparral species endemic to the study area include Refugio manzanita *(Arctostaphylos refugioensis),* La Purisima manzanita *(Arctostaphylos purisima)*, Lompoc monkeyflower *(Mimulus arantiacus),* and the federally-listed endangered Lompoc yerba santa *(Eriodictyon capitatum).*[81]

The study area features central maritime chaparral, a type of chaparral considered threatened and sensitive by the California Department of Fish and Game. Central maritime chaparral has several rare and endemic species associated, including the federally-listed endangered Lompoc yerba santa. Central Coast maritime chaparral can be found on Vandenberg AFB and Hollister Ranch.[82-83]

Burton Mesa chaparral is a regionally endemic type of Central Coast central maritime that occurs within the study area on Vandenberg AFB and Hollister Ranch. Local endemics associated with this type of chaparral include La Purisima manzanita (*Archtostaphylos purisima)*, Lompoc monkeyflower (*Mimulus aurantiacus* ssp. *lomocensis)*, fascicled buck brush *(Ceanothus impressus)*, shagbark manzanita *(Arctostaphylos rudis)*, and Santa Barbara ceanothus (*Ceanothus impressus)*.[84]

Oak Woodlands/Forests: Coast live oak (*Quercus agrifolia*) is the most common oak tree and woodland within the study area. Stands can be found on north facing slopes with understories of either chaparral or coastal sage scrub. Southern oak communities within the Gaviota study area are highly threatened ecosystems. Jalama Creek is one of the only sites that contains California walnut *(Juglans californica*), an important indicator species for the southern oak habitat. The California Native Plant Society lists California walnut as a plant of limited and infrequent distribution.[85]

The Las Cruces area, or Gaviota Gorge, features a unique occurrence of valley oak woodlands. While most valley oaks (*Quercus lobata*) are found 10 miles inland from the coast, the topography of this area allows for its growth only 3 miles inland.[86-87] Valley oak systems are highly threatened in Santa Barbara County. Populations have been declining due to changes in land use that include vineyards and rural residential development.[88]

Tanbark Oak Forest: Tanbark oak forest within the study area is found at its southern limits on Vandenberg AFB, and in rare patches east of Point Conception. Dominant tree species of this forest include tanbark oak *(Lithocarpus densiflorus)* and madrone *(Arbutus menziesii).* The forest on Vandenberg AFB is an unusual occurrence of a single canopy dominant tanbark oak forest. The relic patches of this forest type are remnants from a time period when the Santa Barbara area had a wetter and cooler climate.[89] Ledyard Stebbins' National Park Service report on natural resources along California's south and central coastal areas makes note of these relic forests and speculates that rare and unusual animals might be found in these areas.[90] They exist on northern facing slopes and canyons of the Santa Ynez Range.[91] Tanbark oak forests can also be found on Hollister Ranch along de la Crest Road.[92]

Bishop Pine Forest: Vandenberg AFB is home to the southernmost stand of bishop pine forest on mainland North America. Similar to tanbark oak forest, bishop pine is a relic forest. It is a rare ecosystem because of its limited extent, genetically distinct population, and its use as habitat for the western gray squirrel (*Sciurus griseus)* and Lompoc yerba santa *(Eriodictyon capitatum).* The main threat to the Vandenberg AFB stand is a fungal disease known as pitch canker.[93]

Rare, Threatened and Endangered Species: The study area contains 24 federally- or state-listed threatened or endangered plant and animal species. Another 60 species of rare and special concern also inhabit the study area (See Tables A1 and A2 in the "Tables" section and the Natural Resources map in the "Maps" section, for habitat and species locations).

Significant Plant Species

The study area is home to 29 species of vascular plants considered rare, threatened, endangered, or species of concern by federal and state governments (See Table A1). Federally-listed endangered species (FE) include the Gaviota tarplant, Lompoc yerba santa, beach layia, Gambel's water cress, and a rare occurrence of soft-leaved indian paintbrush. The Gaviota tarplant and the Lompoc yerba santa are found only on the Gaviota Coast. The US Fish and Wildlife Service designated critical habitat areas for both the Gaviota tarplant and Lompoc yerba santa. Critical habitat areas define habitat essential for the recovery of a listed species.

Gaviota tarplant, FE (*Deinandra increscens* ssp. *villosa*)**:** Endemic to the Gaviota Coast, the Gaviota tarplant is most often found in western Santa Barbara County in association with grasslands and coastal sage scrub. Populations of Gaviota tarplant are found in locations along the

coast from Point Sal to Gaviota. Threats to the Gaviota tarplant include destruction of individual plants, habitat loss and degradation from petroleum production. Critical habitat units have been designated for the portions of Sudden Peak and a 23-mile stretch along the coast from Point Conception to Gaviota State Park.[94]

Lompoc yerba santa, FE (*Eriodictyon capitatum*)**:** The primary habitat for Lompoc yerba santa includes central coast maritime chaparral and bishop pine forests. Lompoc yerba santa can only be found in Santa Barbara County near the coast. Sites within the study area include three locations on Vandenberg AFB and chaparral areas on Hollister Ranch. Threats to Lompoc yerba santa include invasive plant species, low seed productivity, and naturally occurring, catastrophic events. Within the study area, a critical habitat unit has been designated in the Santa Ynez Mountains between Canada del Cojo and Arroyo Bullito.[95-97]

Beach layia, FE (*Layia carnosa*)**:** Beach layia is a small, succulent annual herb found on California coastal dunes. This species meets its southern most limits on Vandenberg AFB where a small population exists on coastal dunes. Threats to beach layia include trampling, residential development, off-road vehicles, and invasion by exotic plants. Vandenberg AFB has currently restricted access and maintenance activities within a one-half mile radius of these areas and monitors existing populations annually.[98-100]

Gambel's watercress, FE (*Rorippa gambelii)***:*** Gambel's watercress is an herbaceous perennial found in freshwater or brackish marsh habitats at the margins of lakes and along slow-flowing streams. A small population of Gambel's watercress was found on Vandenberg AFB in 1996. Threats to Gambel's watercress habitat include alteration of hydrology, competition with encroaching eucalyptus trees, urban development, and hybridization with similar species. Vandenberg AFB is currently working with the California Department of Fish and Game to reintroduce Gambel's watercress in new locations.[101-103]

Soft-leaved Indian Paintbrush, FE *(Castilleja mollis):* Soft-leaved indian paintbrush is a partially parasitic perennial herb found on San Miguel and Santa Rosa islands. The primary habitat for soft-leaved indian paintbrush is scrub vegetation. It is dependent on a host species such as goldenbush (*Isocoma menziesii* var.) for water and dissolved resources. Threats to this species include trampling, soil loss, herbivory by deer and invasive species.[104-105] The only reported instance of this species within the study area is on the Canada de Cojo, two miles north of Cojo Bay.[106]

Significant Wildlife

An area of high species diversity, the study area provides habitat to many rare and endangered wildlife species. Estuaries of the Santa Ynez River and the San Antonio Creek remain important nurseries to the sea, and are important to the health and integrity of the marine systems associated with the inshore waters and the adjoining CINMS. Within the study area there are 55 species of wildlife listed as threatened, endangered or species of concern by the state or federal governments (See Table A2 in the "Tables" section).

The 13 federally-threatened (FT) or endangered (FE) species are the tidewater goby, unarmored threespine stickleback, southern steelhead, California red-legged frog, western snowy plover, southwestern willow flycatcher, California condor, bald eagle, brown pelican, California clapper rail, California least tern, least bell's vireo, and the southern sea otter. The US Fish and Wildlife Service has designated critical habitat areas for the tidewater goby, the California red-legged frog, southern steelhead, and the western snowy plover. In addition to rare and endangered species, the study area is home to several marine mammal haulout sites (coastal areas where marine mammals congregate on land) and one of the largest wintering habitat sites of Monarch butterflies in California.

Tidewater goby, FE *(Eucyclogobius newberryi):* The tidewater goby is an endemic fish species. Historically, the southern population of tidewater

gobies occupied the coastal lagoons formed at the mouths of small to large coastal rivers, streams, or seasonally wet canyons. Its sensitivity to change makes the tidewater goby an indicator species for the health of coastal lagoons or estuarine wetlands. Loss or degradation of habitat due to water diversions, exotic species invasion, construction, pollution and siltation are the largest threats to recovery.[107] Tidewater goby have been located in all major creeks on Vandenberg AFB, and in several creeks along the coast from Point Conception to Devereux Slough including Damsite, San Augustin, Agujas, El Bulito, Santa Anita, Alegria, Aqua Caliente, Gaviota, Arroyo Hondo, Arroyo Quemado, Eagle, Tecolote and Bell creeks.[109-110]

Unarmored threespine stickleback, FE *(Gasterosteus aculeatus williamsoni):* The unarmored threespine stickleback is a small, scaleless, native fish that resides in slow water creeks along the California coast. It is endangered in its native habitat, the western and northeastern seaboards of the United States. Populations within the study area are located on Vandenberg AFB in San Antonio and Canada Honda Creeks. Threats include habitat loss through stream channelization, increased water turbidity, introduction of non-native competitors, water pollution, aquifer draw downs, and beaver activity.[111-112]

Southern Steelhead, FE *(Oncorrhynchus mykiss irideus):* Southern steelhead are winter-run steelhead whose native habitat occurs in basins along the southern California coast. The coastal watersheds of the study area provide essential habitat for steelhead. Steelhead require quality freshwater, marine, and estuarine ecosystems to support a healthy population, and therefore serve as an important indicator of watershed health. All tidally influenced waters within the study area are designated in the 1996 amendments to the Magnuson-Stevens Fishery Management and Conservation Act as "Essential Fish Habitat." Additionally, the study area steelhead are part of the Southern California Evolutionarily Significant Unit (ESU). An Evolutionarily Significant Unit is a distinctive group of Pacific salmon, steelhead, or sea-run cutthroat trout. Critical habitat has been designated for the reaches of all rivers including estuarine areas and tributaries.[113]

Populations of steelhead can be found on Vandenberg AFB in the San Antonio Creek watershed, Santa Ynez River, freshwater habitat on Hollister Ranch, the Arroyo Hondo watershed, and Tecolote Creek. Canada Honda, Gaviota, San Onofre, Arroyo Quemado, Refugio, Gato Canyon, Dos Pueblos Canyon, Devereux, and Tecolote Creeks have been identified by the National Marine Fisheries Service as highly suitable creeks for steelhead. Threats to this species include habitat loss, in-stream barriers, dredge and fill activities, and reduced water flow.[114-119]

California red-legged frog, FT *(Rana aurora draytonii):* California red-legged frog habitat includes shrubby riparian areas and deep, slow moving water.[120] Within the study area the frogs inhabit coastal drainage basins that include the San Antonio, Wood, Canada de Cojo, Santa Anita, Agua Caliente, Sacate, Cuarta, Alegria, Gaviota, Arroyo Hondo, Arroyo Quemado and Tajiguas creeks.[121-123] Threats to the California red-legged frog include habitat degradation, off-road vehicles, reservoir construction, grazing, non-native aquatic predators, and water quality. Critical habitat for the red-legged frog was designated on March 13, 2001.[124] However, as a result of recent litigation, the red-legged frog critical habitat designation has been vacated, and a revised critical habitat designation will be promulgated following further consideration of the economic impacts of the designation.

Western snowy plover, FT *(Charadrius alexandrinus nivosus):* The western snowy plover is a migratory bird species that nests and winters on sandy marine and estuarine shores. The western snowy plover has nesting sites on Vandenberg AFB from Point Sal to Purisima Point, the mouth of the Santa Ynez River, and Coal Oil Point. Additional nesting sites have also been studied on Bulito, Percos, and Drake's beaches. Threats to habitat include human disturbance to nests and breeding sites, predation, and habitat loss due to invasion of

exotic species. Vandenberg AFB has restricted public access to nesting sites during the nesting season from March 1 through September 30. Vandenberg, Santa Ynez River mouth, Ocean, Jalama and Devereux beaches have been designated as critical habitat areas by the U.S. Fish and Wildlife Service.[125-128]

Southwestern willow flycatcher, FE *(Empidonax trailii extimus):* The southwestern willow flycatcher is a small insectivorous bird that makes its home in dense riparian areas in the study area. Nesting takes place primarily in thick riparian stands of willows or coast live oaks. Threats such as cowbird parasitism and habitat destruction from urban, recreational, and agricultural development have reduced the species so that, on the California coast, they can only be found in small isolated populations. The southwestern willow flycatcher has been observed on Vandenberg AFB along the Santa Ynez River and at Santa Anita Creek.[129-131]

California condor, FE *(Gymnogyps californianus):* The California condor is considered the largest land bird in North America. Although critical habitat was designated in 1976, the condor's vulnerability to extinction required a captured breeding and release program. The Los Padres National Forest is one of the California Condor Recovery Program release sites. While at least one wild born condor chick has been recently been identified, most breeding takes place in captivity. Approximately 60 California condors are now surviving in the wild within California and Arizona.[132-134]

Bald eagle, FT *(Haliaeetus leucocephalus):* The bald eagle was federally-listed as an endangered species in 1971. In 1995 the bald eagle was removed from the endangered list and upgraded to threatened status as its population grew. Bald eagles are associated with aquatic ecosystems. Nest sites are typically in large trees along shorelines in remote areas. The major threats to the bald eagle for the present and foreseeable future include destruction and degradation of habitat and environmental contaminants. Delisting of the bald eagle under the Endangered Species Act was proposed by the U.S. Fish and Wildlife Service in 1999. While this rule would remove the bald eagle from protection status under the Endangered Species Act, it would still be protected by the Bald and Golden Eagle Protection Act.[135-136] Bald eagles have been sighted at the mouth of the Santa Ynez River.[137]

Brown pelican, FE *(Pelecanus occidentalis californicus):* The brown pelican's breeding sites

California condor, CDFG photo

bald eagle, CDFG photo

can be found only in the Southern California Bight. Breeding sites are located on the Channel Islands and a few islands off the coast of Baja California.[138-139] Brown pelicans have been found roosting and feeding on coastal bluffs and cliffs at Point Sal, on Vandenberg AFB, Percos Beach, Arroyo Hondo, and Dos Pueblos Creek.[140-145]

California clapper rail, FE *(Rallus longirostris obsoletus):* The California clapper rail's habitat is restricted to coastal sloughs and estuaries. It is threatened by predation, loss of habitat, water quality, and non-native species invasion.[146-147] Clapper rails within the study area have historically been found in wetland areas such as the Devereux Slough.[148]

California least tern, FE *(Sterna antillarum browni):* The California least tern is a migrating waterfowl that nests in coastal areas with sparse vegetation. Threats to the least tern include habitat disturbance and predation.[149-150] Nesting sites have been found on coastal dunes and strand at Vandenberg AFB, Point Sal, and Devereux Slough and around the mouth of the Santa Ynez River.[151-153]

Least bell's vireo, FE (*Vireo bellii pusillus):* The least bell's vireo is a summer resident whose habitat consists of oak woodlands and cottonwood-willow woodlands. Loss of riparian habitat, military disturbance, non-native species invasion and predation, and long-term camping threaten the least bell's vireo. A critical habitat area for least bell's vireo is located on the Santa Ynez River, and Vandenberg AFB. However, sightings have been extremely rare.[154] Least bell's vireo have also been found along Devereux Creek and its tributaries.[155]

Marine Mammals: The Gaviota Coast study area coast is frequented by marine mammal species such as pinnipeds and cetaceans. Pinnipeds include seals, sea lions and fur seals. Cetaceans include dolphins, porpoises and whales. These species can be viewed from many points along the coast.

Federally-listed threatened and endangered marine mammal species that could potentially be observed from the coast include stellar sea lions *(Eumetopias jubata)*, guadalupe fur seals *(Arctocephalus townsendi)*, sperm whales (*Physeter macrocephalus)*, blue whales (*Balaenoptera physalus)*, humpback whales *(Megaptera novaeangiliae)*, and fin whales *(Balaenoptera physalus)*.[156-157]

Pinnipeds such as the Pacific harbor seals (*Phoca vitulina*) and California sea lions (*Zalophus californianus*) use isolated beaches and rocks along the coast for hauling out and pupping grounds. The Santa Barbara County Coastal Plan designated these areas as "Environmentally Sensitive Habitat." Known haul out sites within the study area include locations at Point Sal, Purisima Point, Rocky Point, Point Conception, Jalama, Hollister Ranch, Naples, Ellwood, and the sandy coastal area between Dos Pueblos and Eagle Canyons.[158-164]

The southern sea otter (FT) (*Enhydra lutris nereis)* can also be found along the study area coast. Historic populations were reduced by commercial exploitation and human predation. A major oil spill is likely the most serious potential threat. Otters are more susceptible to oil than other species because they lack the insulating layer of blubber that most marine mammals have and instead rely on their thick, air-filled fur for insulation. Contamination by oil would cause the otter fur to lose its insulation. Southern sea otters feed off of extensive kelp beds along the Santa Barbara Channel. Cojo Bay is used seasonally by as many as 200 sea otters. A resident breeding colony exists off the coast of Vandenberg AFB.[165]

The Santa Barbara Channel coast is well known for whale watching. Several species migrate through the Santa Barbara Channel. The gray whale (*Eschrichtius robustus*) is commonly spotted in the Santa Barbara Channel. Gray whales use Point Conception as a reference point during migration, and often come within a few 100 meters from the shore.[166-167]

Monarch Butterfly Wintering Habitat: In the fall, monarch butterflies west of the Rocky Mountains migrate through the western states and

the southern portions of western Canada to "overwintering" sites along the California sea coast. Monarch butterfly *(Danaus plexippus)* overwintering sites and annual migration are threatened by human activity. Because monarch butterflies are most vulnerable at their overwintering sites, the International Union for Conservation of Nature and Natural Resources classified the migration and overwintering behavior of the monarch butterfly as a "threatened phenomenon."[168] The Santa Barbara County Coastal Plan considers wintering sites "Environmentally Sensitive Habitat."[169]

Nationally, there are two populations of monarch butterflies located east and west of the continental divide. Both have migrating populations that wait out winter south of the freeze line. This creates spectacular aggregations in California and Mexico. Each winter monarchs aggregate in approximately 25 roosting sites along the study area coast. These overwintering sites have very particular environmental characteristics that are vulnerable, especially to the threat of development.[170]

At the eastern end of the study area is one of California's largest overwintering sites for monarch butterflies, known as Ellwood Main. The massive eucalyptus grove has hosted up to 100,000 monarchs in previous years.[171] Monarchs are drawn to Ellwood Main because of the unique combination of eucalyptus groves and topographic site features that protect them from heat, cold, wind and storms. Additional major wintering sites include Upper Wood Canyon and Cojo Ranch Headquarters on Bixby Ranch, Arroyo el Bulito, Canada de Santa Anita, Arroyo del Cementario, Canada Alcatraz, Las Varas Ranch, Dos Pueblos Ranch, Eagle Canyon, and Ellwood North.[172-173]

monarch butterflies, © Rich Reid / Colors of Nature